

# Western Wildfires and Climate Change

An Infographic from the Union of Concerned Scientists

## Methodology and Assumptions

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The [Western Wildfires and Climate Change infographic](#) is based on careful evaluations of published scientific research and publicly available federal data on wildfires. What follows is an account of the data sources and assumptions for each of the three panels presented in the infographic.

### Panel 1

#### *Average number of large wildfires per year*

The decadal averages are for reported wildfires greater than 1000 acres on all federally-administered public land in the 11 Western states in the contiguous United States.

These numbers were generated from [Federal Wildland Fire Occurrence Data](#), which covers the period 1980 to 2012. To obtain reported wildfires greater than 1000 acres, the two size classes, F: 1000.0-4999.9 acres and G: 5000.0 acres and larger, were selected for each state individually in every year over the available period. These annual totals were summed for the entire Western U.S., from which the decadal averages were obtained. These decadal averages represent the number of large wildfires, on average, in a given year for each decade throughout the West.

The total decadal numbers should be treated as close approximations. It is possible that a small number of wildfires were double-reported if they occurred over an area that included portions of land managed by different agencies, and if each agency (e.g. Forest Service and Bureau of Land Management) reported the same wildfire occurrence in the national database. However, any potential double-counting would represent only a small systematic error across the entire record; the relative decade-by-decade trends would be largely unaffected.

#### *Average length of wildfire season*

The average length of wildfire season is based on two sources. The first is the report, [The Age of Western Wildfires](#), from Climate Central. It compiles the day of the year for which the first wildfire greater than 1000 acres was reported by the U.S. Forest Service. This record extends back to 1970 from 2012. It also determines the start date of the last reported wildfire each year. It was found that over this period, on average, the length of the fire season has increased by 75 days with most of the lengthening occurring in spring.

In an [earlier study](#), Westerling and co-authors also reported an increase in average wildfire season length. This study focused on large (~1000 acres or greater) wildfires occurring on federal land in the Western U.S. The study defined wildfire season length as the time between first wildfire discovery date and last wildfire control date. Comparing wildfire season length of 1970 to 1986 with 1987 to 2003 they found an increase of 78 days.

## Panel 2

### Rising temperatures in the Western U.S.

The reported warming of 1.9°F since 1970 for the Western U.S. is determined from state-by-state warming trends in the Climate Central report, [The Heat is On: U.S. Temperature Trends](#). In this report, decadal rates of warming since 1970 are determined. These decadal rates were then used to calculate the total warming over the 42-year period from 1970-2012. For instance, Arizona's rate of warming is 0.639°F/decade. For the 42-year period from 1970-2012, this warming rate corresponds to a temperature increase of 2.68° F for the state.

The total warming for each of the 11 states was calculated and these results averaged for a total Western U.S. temperature increase of 1.9° F. The contribution from each state was area-weighted, but there was little difference between the weighted and unweighted averages (1.91°F vs. 1.92°F).

### Earlier snowmelt

The reported earlier spring snowmelt is from a [2005 study](#) by Stewart and coauthors that analyzed data from 302 streamflow gauges throughout Western North America over the period 1948-2002. The study found region-wide trends towards earlier onset of snowmelt and streamflow in spring, although there is variability across individual locations. Depending on the location, the onset of snowmelt and streamflow occurred 1-4 weeks earlier than it did at the beginning of the data record in 1948. A more recent, updated study could not be found through a literature search.

## Panel 3

### Projected increase in annual burn area

The projected area burned graphic is based on one that appeared in the 2011 National Academy of Sciences report, [Climate Stabilization Targets](#). More recently, it was used in a [United States Forest Service report](#) on the effects of climate change and variability on forest ecosystems.

The map shows percent increases in area burned for a 1.8°F (1.0°C) increase in global temperature compared to the median area burned each year over the baseline period 1950-2003. The color contours represent the various ecoregions throughout the West. For instance, the Southern Rocky Mountain Steppe-Forest found in central Colorado is projected to experience a greater percentage increase in area burned than the American semi-desert and desert ecoregion found in southern Arizona and California. Areas shown in grey were not modeled in the original sources.

### Projected temperature increases in the Western U.S.

The projected temperature increases for the 11 Western U.S. states are derived from the [NOAA Regional Climate Trends and Scenarios for the U.S. National Climate Assessment report](#) (Figure 20). They are projected annual mean temperature increases mid-century (2041-2070) compared to the reference period of 1971-1999.

The range (2.5° F-6.5° F) represents the low projections of a lower emission scenario (B1) of heat-trapping gases and the upper end of a higher heat-trapping gases emission scenario (A2). The temperature increase projections are based on the mean output of 14 (B1) or 15 (A2) global climate models each using multiple simulations.

## References:

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